DETAILED ACTION

Claim Rejections - 35 USC § 101 and 112

1. Claim 73 provides for the use of the fluoride of claim 60, where the claim recites a method for preparing a monochromator utilizing the fluoride of claim 60, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 73 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 45-49, 53, 56, and 58 are rejected under 35 U.S.C. 102(b) as being anticipated by Lilley et al. ("Precipitation in LiF Crystals Doped with MgF_2"; hereinafter referred to as Lilley).

3. Regarding claim 45, Lilley discloses a single-crystal lithium fluoride (fig. 6) doped with 0.023 to 0.082 mol per kg (fig. 6; 1.8 mol % MgF_2 is 0.68 mol Mg^{2+} per kg; pg. 574, col. 2, line 11; and fig. 6; 1.8 mol % MgF_2 is 0.68 mol Mg^{2+} per kg) of a divalent positive ion M present in the fluorinated state (fig. 6, MgF_2).

4. Regarding claim 46, Lilley further discloses wherein the ionic radius of the divalent ion M (fig. 6, Mg^{2+}) necessarily ranges from 55 to 80 picometers.

5. Regarding claims 47 and 48, Lilley further discloses wherein M is present (fig. 6, MgF_2) in an amount of at least 0.025 mol per kg, or at most 0.045 mol per kg (pg. 574, col. 2, line 11; fig. 6; 1.8 mol % MgF_2 is 0.68 mol Mg^{2+} per kg).

6. Regarding claim 49, Lilley further discloses wherein M is Mg^{2+} (title).

7. Regarding claim 53, Lilley further discloses wherein said fluoride is present in the form of a cube (paragraph connecting pgs. 571 and 572) or a parallelepiped.

8. Regarding claim 56, Lilley further discloses wherein said fluoride has a cleaved surface (pg. 573, col. 2, last paragraph).

9. Regarding claim 58, Lilley further discloses utilizing the fluoride (abstract).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 50 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lilley as applied to claim 45 above, and further in view of Khulugurov et al. ("Laser active F-aggregate colour centres in LiF monocrystals doped by divalent impurity cations"; hereinafter referred to as Khulugurov).

11. Regarding claim 50, Lilley discloses the manufacture as recited above.

However, Lilley fails to specifically disclose wherein M is Co^{2+}.

Khulugurov teaches wherein M is Co^{2+} (title; abstract, lines 1-2; and pg. 7006, section titled "2. Experimental details", lines 1-2).

It would have been obvious, to one having ordinary skill in the art, at the time the invention was made, to modify the manufacture of Lilley with the Co^{2+} of Khulugurov, because of the following rationale.

Since the Examiner finds that the prior art (i.e., Lilley) contained a manufacture which differed from the claimed manufacture by the substitution of one element for another, and since the Examiner finds that the substituted elements and their functions were known in the art (as shown by Khulugurov in the title and abstract), the Examiner thus finds that one of ordinary skill in the art could have substituted one known element for another, and the results of the

substitution would have been predictable. Therefore, such a claimed combination would have been obvious.

12. Regarding claim 52 and for purposes of being concise, Lilley in view of Khulugurov suggests the manufacture as recited above. Khulugurov further teaches wherein M is Co^{2+} (title; abstract, lines 1-2; and pg. 7006, section titled "2. Experimental details", lines 1-2) as noted above.

However, Lilley fails to specifically disclose wherein M is a mixture of at least two ions chosen from Mg^{2+}, Zn^{2+} and Co^{2+}.

It would have been obvious, to one having ordinary skill in the art, at the time the invention was made, to further modify the manufacture of Lilley with the mixture of at least two ions chosen from Mg^{2+}, Zn^{2+} and Co^{2+}, because of the following rationale.

Since the Examiner finds that the prior art included each element claimed, although not necessarily in a single embodiment, with the only difference between the claimed invention and the prior art being the lack of actual combination of the elements in a single embodiment, and since the Examiner finds that one of ordinary skill in the art could have combined the elements as claimed by known methods, and that in combination, each element merely performs the same function as it does separately, the Examiner thus finds that one of ordinary skill in the art would have recognized that the results of the combination were predictable. Therefore, such a claimed combination would have been obvious.

13. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lilley as applied to claim 45 above, and further in view of Gupta et al. ("Electrical conductivity studies of cobalt-precipitation in RbCl crystals"; hereinafter referred to as Gupta).

Lilley discloses the manufacture as recited above.

However, Lilley fails to specifically disclose wherein M is Zn^{2+}.

Gupta teaches wherein M is Zn^{2+} (pg. 271, Section (1)(i), "LiF: ZnF_2").

It would have been obvious, to one having ordinary skill in the art, at the time the invention was made, to modify the manufacture of Lilley with the Zn^{2+} of Gupta, because of the following rationale.

Since the Examiner finds that the prior art (i.e., Lilley) contained a manufacture which differed from the claimed manufacture by the substitution of one element for another, and since the Examiner finds that the substituted elements and their functions were known in the art (pg. 271, Section (1)(i), as shown by Gupta), the Examiner thus finds that one of ordinary skill in the art could have substituted one known element for another, and the results of the substitution would have been predictable. Therefore, such a claimed combination would have been obvious.

14. Claims 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lilley as applied to claim 45 above.

Lilley discloses the manufacture as recited above.

However, Lilley fails to specifically disclose wherein the volume of the fluoride ranges from 2.5×10^{-3} cm^3 to 30 cm^3, or wherein the volume of the fluoride ranges from 0.01 to 20 cm^3.

It would have been obvious, to one having ordinary skill in the art, at the time the invention was made, to further modify the manufacture of Lilley with the above volume, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. One would have been motivated to make such a modification for more easily handling the component.

15. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lilley as applied to claim 45 above, and further in view of Wittry (US 4882780).

Lilley discloses the manufacture as recited above.

However, Lilley fails to disclose wherein the fluoride has a surface that is ground and then treated in an acid medium or polished.

Wittry teaches wherein a fluoride (col. 12, lines 38-40) has a surface that is ground and then treated in an acid medium or polished (col. 10, lines 56-69).

It would have been obvious, to one having ordinary skill in the art, at the time the invention was made, to modify the manufacture of Lilley with the polishing of Wittry, since one would have been motivated to make such a modification for reducing imperfections to obtain better radiation signals from the fluoride.

Allowable Subject Matter

16. Claims 24-44 and 59-72 are allowed. The following is a statement of reasons for the indication of allowable subject matter.

17. Regarding claim 24, the prior art fails to disclose or fairly suggest an analyzer, including a detector that receives the diffraction lines and converts the diffraction lines into an electrical signal, wherein: the monochromator comprises a single-crystal lithium fluoride doped with at least 0.018 mol per kg of a divalent positive ion M present in a fluorinated state; and the analyzer is configured to perform elemental analysis of the sample, in combination with all of the other limitations in the claim. Claims 25-44 are allowed by virtue of their dependency.

18. Regarding claim 59, the prior art fails to disclose or fairly suggest a process for performing elemental analysis of a sample, including detecting the diffraction lines and converting the diffraction lines into an electrical signal with a detector; wherein the monochromator comprises a single-crystal lithium fluoride doped with at least 0.018 mol per kg of a divalent positive ion M present in a fluorinated state, in combination with all of the other limitations in the claim.

19. Regarding claim 60, the prior art fails to disclose or fairly suggest a single-crystal lithium fluoride doped with 0.023 to 0.082 mol per kg of a divalent positive ion M present in the fluorinated state, wherein essentially all M ions are in the single-crystal cation lattice. Claims 61-72 are allowed by virtue of their dependency.

Response to Arguments

20. Applicant's arguments with respect to claim 73 has been considered but are moot in view of the new ground(s) of rejection. Applicant's arguments filed November 16, 2009, have been fully considered but they are not persuasive.

21. The declaration under 37 CFR 1.132 filed November 16, 2009, is insufficient to overcome the rejection of claims 45-58 based at least upon Lilley applied respectively under 35 U.S.C.102 and 103 as set forth in the last Office action because the showing is not commensurate in scope with the claims.

Applicant refers to LiF crystals containing 0.045 and 0.225 mol% MgF_2 in Lilley not reading on claim 45 at least. However, the Examiner is referring to LiF crystals containing 1.8 mol % MgF_2 (fig. 6; 1.8 mol % MgF_2 is 0.68 mol Mg^{2+} per kg; pg. 574, col. 2, line 11; and fig. 6; 1.8 mol % MgF_2 is 0.68 mol Mg^{2+} per kg) as reading on claim 45 at least. Since Applicant has not argued why LiF crystals containing 1.8 mol % MgF_2 does not read on at least claim 45, Applicant's arguments are not persuasive, and the claims remain rejected.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571)272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chih-Cheng Glen Kao/
Primary Examiner, Art Unit 2882